



# **GLAST Large Area Telescope Calorimeter Subsystem 11.0 Mechanical Ground Support Equipment**

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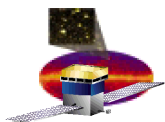




# NRL Mechanical GSE

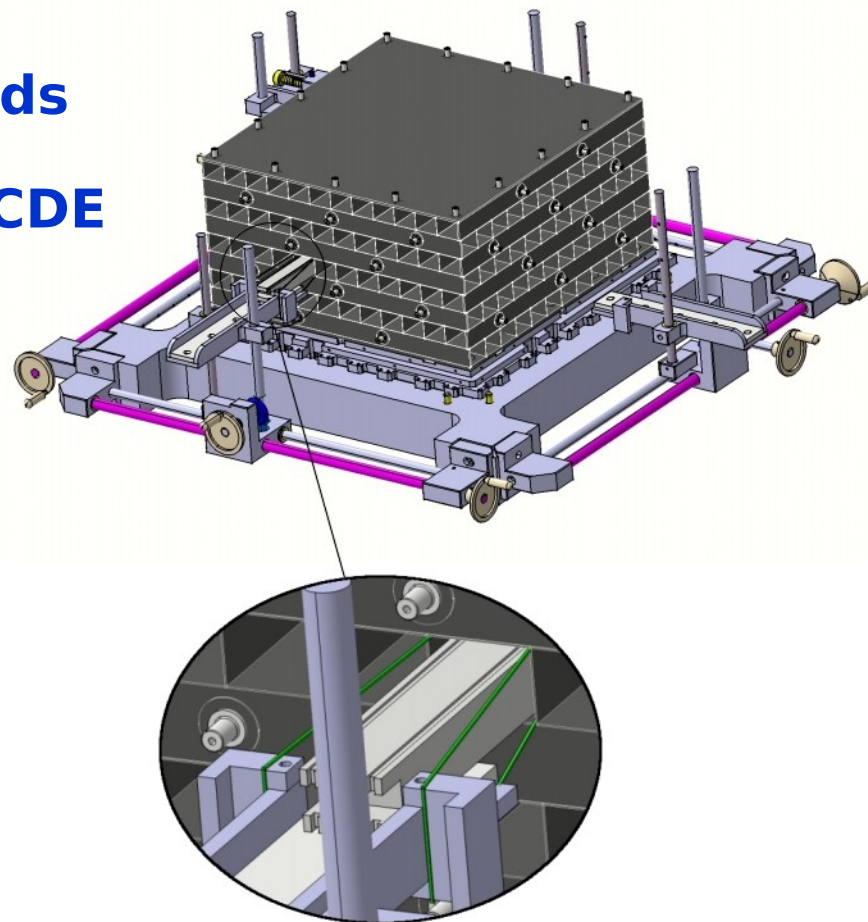
SUPPORT EQUIPMENT	DRAWING NUMBER	STATUS
<b>ASSEMBLY TOOLING</b>		
- CDE Insertion Tooling		Modification to Current EM Design is On-Going
CDE Insertion Tooling, Top Level Assembly	LAT-DS-01521	
- PEM Assembly Tooling		Fabrication is Complete
AFEE Board Integration Tooling	LAT-DS-01520	
<b>TEST FIXTURES</b>		
- TVAC Test Fixture		Detailed Design is Complete. Fabrication is On-Going
CAL Thermal Vacuum Test Fixture, Top Level Assembly	LAT-DS-01361	
CAL TVAC Test Fixture, Plate, Base	LAT-DS-01362	
CAL TVAC Test Fixture, Bar, Support	LAT-DS-01363	
CAL TVAC Test Fixture, Plate, Side	LAT-DS-01364	
CAL TVAC Test Fixture, Plate, Top	LAT-DS-01365	
CAL TVAC Test Fixture, Isolator, Base	LAT-DS-01366	
CAL TVAC Test Fixture, Isolator, Side	LAT-DS-01367	
CAL TVAC Test Fixture, Isolator, Top	LAT-DS-01368	
CAL TVAC Test Fixture, Washer, Shoulder	LAT-DS-01369	
- Vibration Test Fixture		Detailed Design is Complete. Fabrication is On-Going
CAL Vibration Test Fixture, Top Level Assembly	LAT-DS-01514	
CAL Lift Fixture, Plate, Base	LAT-DS-01515	
CAL Lift Fixture, Channel, Short	LAT-DS-01516	
CAL Lift Fixture, Channel, Long	LAT-DS-01517	
CAL Lift Fixture, Plate, Short	LAT-DS-01518	
CAL Lift Fixture, Plate, Long	LAT-DS-01519	
- EM Translation Stage	N/A	BTEM Fixture Exists
<b>GROUND SUPPORT EQUIPMENT</b>		
- EM Lift Fixture		Fabrication of EM Fixture is Complete
CAL Lift Fixture, Top Level Assembly	LAT-DS-01526	
CAL Lift Fixture, Corner Fixture	LAT-DS-01527	
CAL Lift Fixture, Spreader Bar	LAT-DS-01528	
- EM Handling Fixture		Fabrication of EM Fixture is Complete. Design of Flight Fixture is Complete.
CAL Handling Fixture, Top Level Assembly	LAT-DS-01523	
CAL Handling Fixture, Base Plate	LAT-DS-01524	
CAL Handling Fixture, Posts	LAT-DS-01525	
- CAL Shipping Container	LAT-DS-01522	Preliminary Design is On-Going
- Rotation/Assembly Stand	N/A	Modifications to Existing Fixture is Complete





# Assembly Tooling

- ❑ **CDE Insertion Tooling**
  - **Secures Elastomeric Cords in Tension**
  - **Supports and Positions CDE During Insertion**

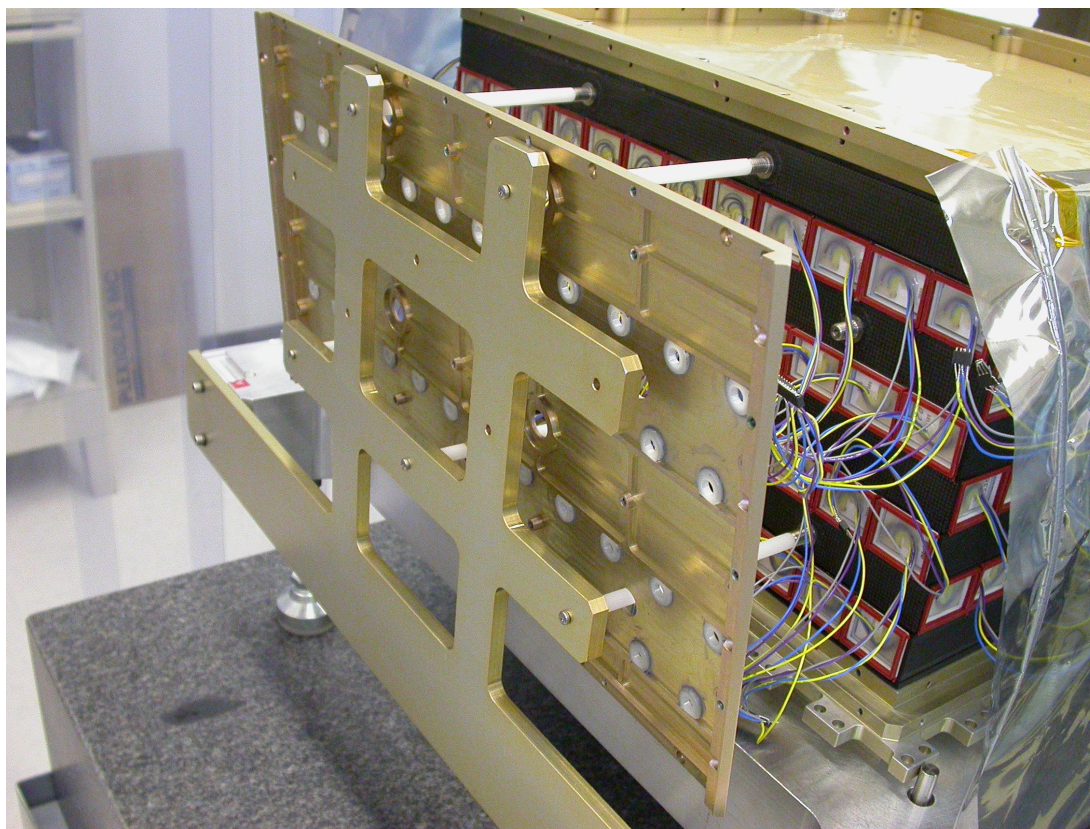






# Assembly Tooling

- **PEM Assembly Tooling**
  - **Supports Close-Out Plates During PEM Assembly**
  - **Supports AFEE Cards During PEM Assembly**

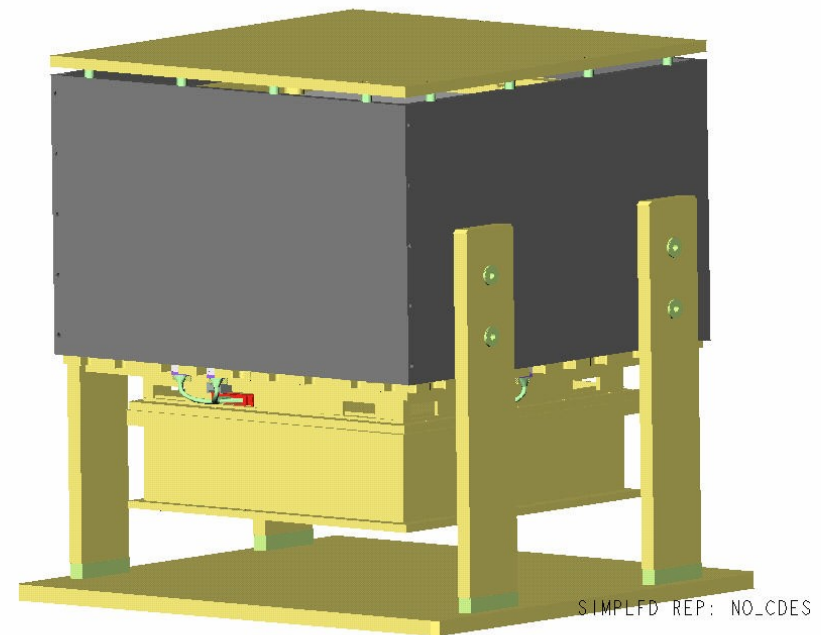




# Test Fixtures

## □ TVAC Test Fixture

- Supports CAL Module-TEM/TPS Assembly during TVAC Testing
- Represents Inside Surface of LAT-Grid
- Designed For Cold-Biased Test Environment. Heaters Attached to Fixture Control Temperature.
- Cold Plate Attached to TEM/TPS Represents X-LAT Plate

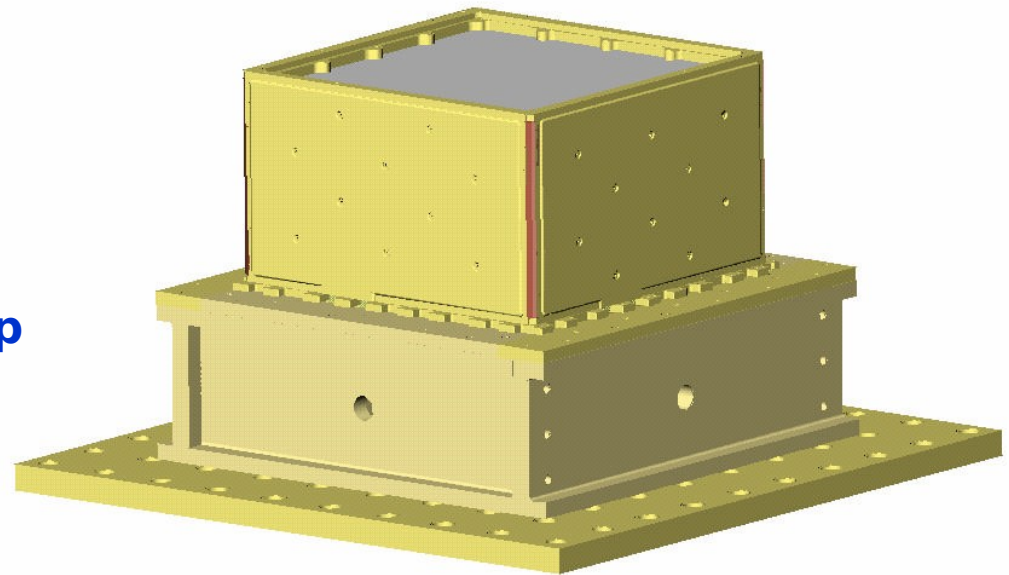




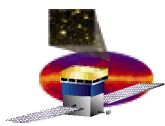
# Test Fixtures

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- ❑ **Vibration Test Fixture**
  - **Supports CAL Module-TEM/TPS Assembly**
  - **Attachment Represents Flight CAL Tab-Grid Interface**
  - **Used for All Structural Environment Test Activities:**
    - **Low-Level Sine Sweep**
    - **Random Vibration**
    - **Sine Burst**



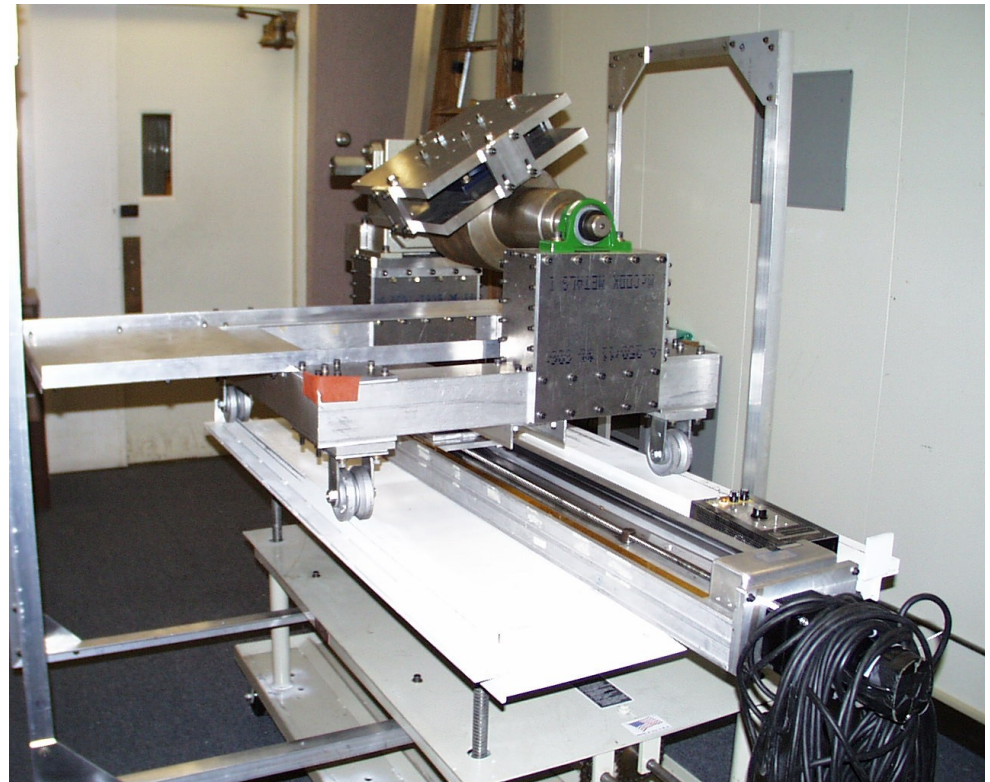




# Test Fixtures

- ❑ **EM Translation Stage**
  - **Rotation/Assembly Stand Attaches to System**
  - **Allows Mapping of EM in Accelerator Beams**
  - **Includes Support for Ancillary Detectors**
  
- ❑ **Requirements**
  - **>40 cm 2D Motion**
  - **<1 mm Accuracy**
  - **90 deg Pitch Rotation**
  - **<1 deg Accuracy**
  - **>120 kg Capacity**

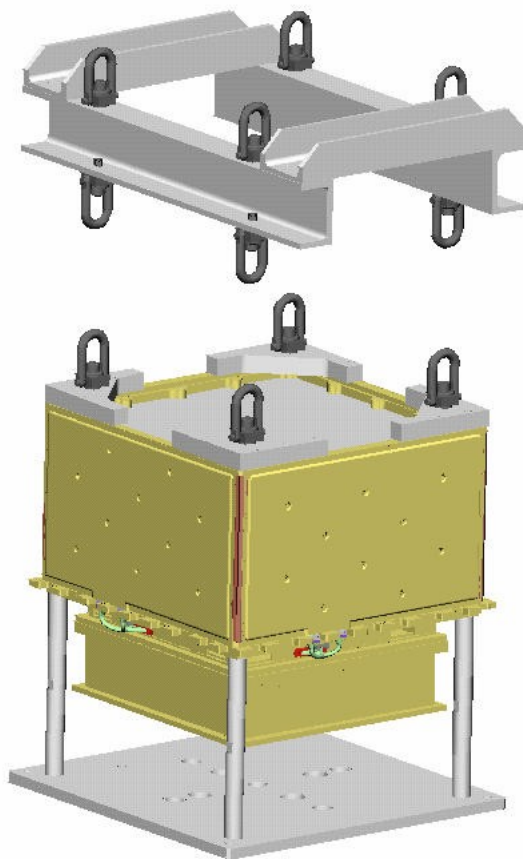
BTEM prototype





# Ground Support Equipment

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## □ Lift Fixture

- Distributes Lift Load During Crane Operations
- Consists of:
  - 4 Corner Brackets
  - 1 Spreader Frame
  - Nylon Slings



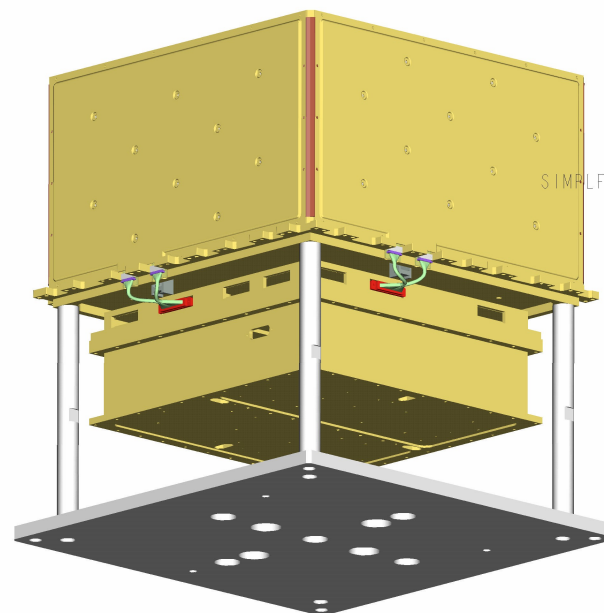




# Ground Support Equipment

## □ Handling Fixture

- Supports CAL Module - TEM/TPS Assembly
- Provides Interface to the Following MGSE:
  - Shipping/Storage Container for Testing and Storage
  - LAT-Rotation/Assembly Stand (NRL)
  - LAT-Grid Integration Tooling (SLAC)
    - Turn-Over Fixture
    - LAT-Grid Lift Fixture
    - LAT-Grid Alignment Tool

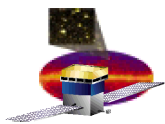




# Ground Support Equipment

- ❑ **CAL Shipping/Storage Container**
  - **Outer Shipping Container**
    - **Wheeled Dolly with Cover**
  - **Inner Pressure Housing**
    - **Provides Dry Nitrogen Environment**
  - **Shock-Mount Suspension**
  - **1 Container per Module**

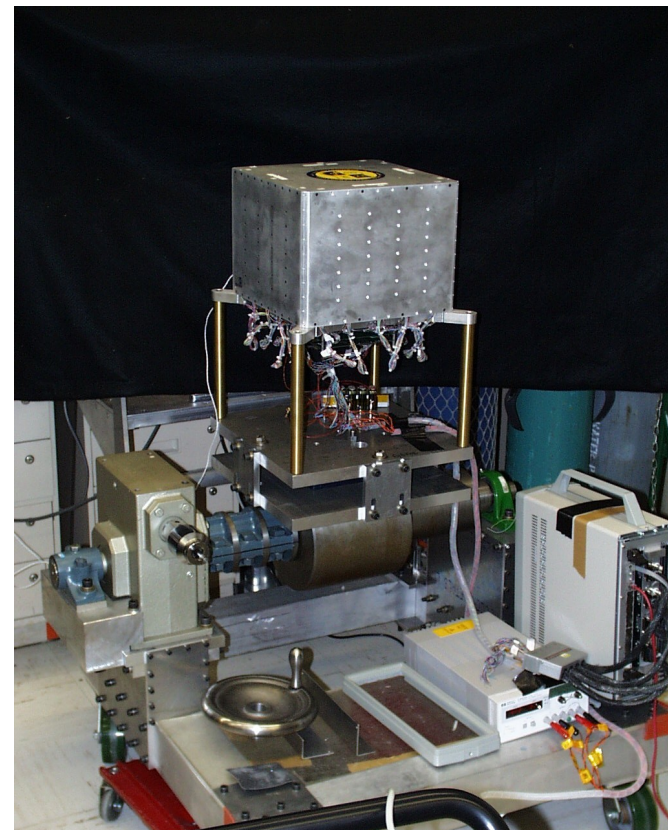




# Ground Support Equipment

## □ Rotation/Assembly Stand

- Existing Fixture - BTEM Rotation / Assembly Stand. Will be Duplicated for Flight
- Modified to Support CAL EM Module
- Allows Assembly Technician and Engineer Easy Access to Each Side of CAL in Horizontal, Vertical or Any Pitch
- Used for AFEE Card Integration
- Interfaces to EM Translation Stage to Support Beam Testing



BTEM prototype

